Remarks

By the Office Action mailed on June 7, 2002, Claims 1-9 are pending and currently rejected by the Examiner and Claims 10-18 have previously been withdrawn. By the present Amendment and Response, Claim 1 is amended, Claim 2 is cancelled, and new Claims 19 and 20 are presented. No fee is believed due for the new Claims.

Applicant believes no new matter has been added. Prior to the entry of these amendments, Claims 1-9 stand rejected in the application. Reconsideration of the present application is respectfully submitted in view of the above amendments to the application and in view of the following remarks.

The Examiner rejects Claims 1-9 under 35 U.S.C. §103(a) as being unpatentable over Okuri et al. (U.S. Patent No. 4,943,604), Saito et al. (U.S. Patent No. 5,194,502), Loise et al. (U.S. Patent No. 3,624,178), and Japanese Patent Nos. 60-206882, 60-235877, and 49-97052 in view of Eadara (U.S. Patent No.5,198,065 and the article entitled "Enhancement of Underfill Performance for Flip-Chip Applications by Use of Silane Additives" article by Vincent et al.

To establish a prima facia case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must be found in the prior

art and not based on applicant's disclosure. See In re Vaeck, 947 F.2d 488 (Fed. Cir. 1991).

The rejection fails to meet these requirements. The rejection fails to show that there has been some suggestion or motivation to modify or combine the references cited above or that there would have been a reasonable expectation of success of the combination. As evidenced by the NCMS tests referenced on page 2 of the specification, epoxies that are not based on epoxy-terminated polyurethanes have failed the NCMS drop test. Therefore, there would not have been a motivation to combine adhesion promoters with epoxy-terminated polyurethanes because there would not have been an expectation of success since every electrically conductive adhesives that was tested by NCMS failed the drop test. Because the use of adhesion promoters have been limited to certain specific uses in the prior art, there would not have been any suggestion or motivation to use the adhesion promoter in the claimed invention.

The Examiner cites a number of references as containing an epoxy-terminated polyurethane. These compounds, as the Examiner notes, do not contain adhesion promoters. However, the compounds cited also all contain additional components which differ from the components of the claimed invention making the cited art fail to specifically suggest or motivate the claimed compounds because they do not suggest not using the additional compounds which are not present in the claimed compounds and adding an adhesion promoter. *Okuri* describes an epoxy that does not contain either the adhesion promoter or the conductive filler. Also, the anti-corrosion adhesive described in *Okuri* also contains a rubber modified epoxy resin. There is no suggestion or motivation that this compound would be effective without the rubber modified epoxy resin, especially

given that the purpose of the adhesive is to have excellent anti-corrosion properties. There is no suggestion by *Okuri* that this compound would be effective as an electrically conductive adhesive or that there would be any motivation to add an adhesion promoter to this type of compound.

Saito also does not suggest or motivate the claimed compounds. *Saito* describes a mixture of epoxies which includes a bispenol epoxy resin in addition to the urethane-modified epoxy resin. There is no suggestion or motivation that the mixture described by *Saito* could be used as an electrically conductive adhesive by removing the bispenol epoxy resin. In addition, there is no suggestion or motivation to add an adhesion promoter to this compound because the purpose of the invention is to use the epoxy while assembling car bodies.

Lohse also does not suggest or motivate the claimed compounds. *Lohse* does not describe the claims as amended. In addition, there is no suggestion or motivation in *Lohse* for the addition of an adhesion promoter. Given the fact that the addition of adhesion promoters were not effective to other non- epoxy-terminated polyurethanes, there could not be a reasonable expectation of success to combine an adhesion promoter to the compounds described in *Lohse*.

Japanese Patents 60-206882, 60-235877, and 49-97052 do not suggest or motivate the claimed compounds. These patents describe epoxies which also include epoxy resins of a glycidyl ether type ('882 Patent and '877 Patent) or other epoxy resins in addition to the urethane resin. These compounds contain additional compounds instead of the adhesion promoter because the compounds are being used for a different purpose

(bonding steel plates). Therefore, there would be no suggestion or motivation to remove these additional compounds to add the adhesion promoter.

The prior art which the Examiner combines with the above referenced patents can not teach or suggest the claimed invention because the adhesion promoters are used in those references to solve problems that are not at issue in the claimed invention. As noted earlier, every commercial electrically conductive adhesive tested by the NCMS failed the drop test. As seen in Example 3, epoxy-terminated polyurethanes containing the adhesion promoter pass the NCMS drop test. The addition of adhesion promoters to every possible composition can not be obvious simply because the use of adhesion promoters with certain specific compositions is known. Especially, given the fact that none of the cited art relates to electrically conductive compounds that pass the NCMS drop test.

Specifically, *Eadara* fails to suggest or motivate the combination with any of the above mentioned patents because of the context in which the epoxy silane is used. In *Eadra*, the epoxy silane is used in combination with a low viscosity primer, a diglycidyl ether, and a hardener component. The epoxy silane is used to provide the cured adhesive resistance to moisture. The resistance to moisture is necessary because the epoxy is being used to bond steel to moist wood. Because the epoxy compound being used in the claimed invention does not bond steel to moist wood, or moist metals, there would be absolutely no motivation to combine this reference with any of the patents that are referenced above. Because *Eadra* only teaches the use of the epoxy silane as a means to provide resistance to moisture, there is no expectation of success in using the epoxy silane in an electrically conductive adhesive. In addition, the drop test data referenced above, shows that every commercial electrically conductive adhesive tested by the NCMS failed

the drop test. Therefore, one would not have expected the results that were obtained using the epoxy-terminated polyurethanes with an adhesion promoter.

The article entitled "Enhancement of Underfill Performance for Flip-Chip Applications by Use of Silane Additives" article by Vincent et al. also fails to suggest or motivate the combination with any of the above mentioned patents because of the context in which the epoxy silane is used. The epoxy functionalized silane coupling agents were found to increase the viscosity and contact angle of the underfill resin and to increase the adhesion of the underfill to alumina. Again, this is not the use described by the claimed invention and does not teach or suggest the results of combining the adhesion promoter to the epoxy-terminated polyurethanes. *Vincent* teaches the enhancement of underfill for flip-chip application. Therefore, there could not have been an expectation of success of combining this reference with any other reference because this reference does not teach the same use of the adhesion promoter. The adhesion promoter in the claimed invention is used for solder replacement and the above references do not teach or suggest that their use would be effective with epoxy-terminated polyurethanes.

Applicant respectfully submits that amended claim 1 is now in condition for allowance. Furthermore, claims 3-9 and 19-20, which are dependent upon independent claim 1, are also deemed to be in condition for allowance for the various limitations contained therein.

Conclusion

Pursuant to the above amendments and remarks, reconsideration and allowance of the pending application is requested. The Examiner is invited and encouraged to directly contact the undersigned with comments or questions.

No fee is believed due. However, the Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 20-1507.

Respectfully submitted,

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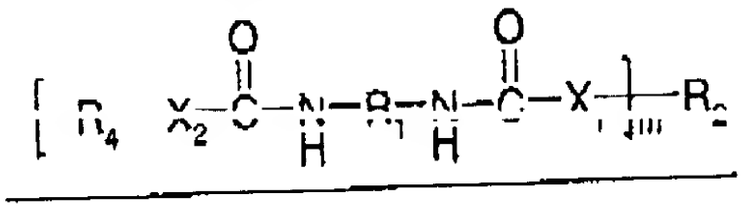
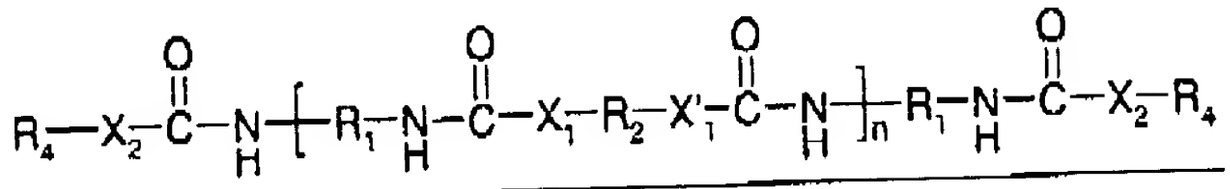
Marked Up Copy of Claims

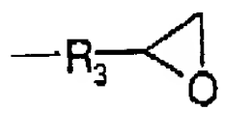
1. (Once Amended) An electrically conductive adhesive comprising (a) an epoxide-modified polyurethane resin; (b) a cross-linking agent; (c) an adhesion promoter; and (d) a conductive filler, wherein the epoxide-modified polyurethane resin has the following structure:



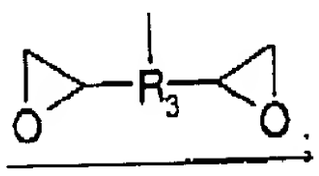
or



where m is 2 or 3; n is one or greater; R_1 is an aliphatic hydrocarbon radical, a cycloaliphatic hydrocarbon radical, an aromatic hydrocarbon radical, or an araliphatic hydrocarbon radical; R_2 is an aliphatic hydrocarbon radical, a cycloaliphatic hydrocarbon radical, an alkoxy radical, a polyester; or a polyether; R_3 is either:



or



R_3 is an aliphatic hydrocarbon radical, a cycloaliphatic hydrocarbon radical, an alkoxy radical, a polyester, or a polyether; and X_1 and X_2 are either a single bond, –O–; –COO–; –NH–; or –S–.

19. (New) An electrically conductive adhesive as defined in Claim 1, wherein the adhesion promoter comprises between 0.02% and 10% by weight of the composition.

20. (New) An electrically conductive adhesive as defined in Claim 1, wherein the adhesion promoter comprises between 0.1% and 2.0% by weight of the composition.